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```
IIIIII  SSSSSSSS  DDDDDDDD  SSSSSSSS  000000  RRRRRRRR  TTTTTTTTTT
IIIIII  SSSSSSSS  DDDDDDDD  SSSSSSSS  000000  RRRRRRRR  TTTTTTTTTT
II      SS      DD      SS      00      RR      TT
II      SS      DD      SS      00      RR      TT
II      SS      DD      SS      00      RR      TT
II      SS      DD      SS      00      RR      TT
II      SSSSSS  DD      SSSSSS  00      RRRRRRRR  TT
II      SSSSSS  DD      SSSSSS  00      RRRRRRRR  TT
II      SS      DD      SS      00      RR      TT
II      SS      DD      SS      00      RR      TT
II      SS      DD      SS      00      RR      TT
II      SSSSSSSS  DDDDDDDD  SSSSSSSS  000000  RR      RR      TT
IIIIII  SSSSSSSS  DDDDDDDD  SSSSSSSS  000000  RR      RR      TT
IIIIII  SSSSSSSS  DDDDDDDD  SSSSSSSS  000000  RR      RR      TT
```

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....
....
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....
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```
LL      IIIIII  SSSSSSSS
LL      IIIIII  SSSSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SSSSSS
LL      II      SSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LLLLLLLLLL  IIIIII  SSSSSSSS
LLLLLLLLLL  IIIIII  SSSSSSSS
```


(2) 50
(3) 65

Declarations
lnk\$sortisects sort image section descriptors


```
0000 1 .title ISDSORT Sort image section descriptors
0000 2 .ident 'V04-000'
0000 3
0000 4 *****
0000 5
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0000 23
0000 24 *
0000 25 *****
0000 26
0000 27 ++
0000 28 FACILITY
0000 29
0000 30 Linker
0000 31
0000 32 ABSTRACT
0000 33
0000 34 Sort a list of isect descriptor addresses into virtual address order
0000 35
0000 36 ENVIRONMENT
0000 37
0000 38 Native mode, user mode
0000 39
0000 40 AUTHOR
0000 41
0000 42 Benn Schreiber, 17-Jan-1980
0000 43
0000 44 MODIFIED BY
0000 45
0000 46 V02-003 BLS0007 Benn Schreiber 15-Aug-1980
0000 47 Convert to MDL data structures
0000 48 --
```

ISDSORT
V04-000

Sort image section descriptors
Declarations

J 15

15-SEP-1984 23:55:41
5-SEP-1984 01:42:10

VAX/VMS Macro V04-00
[LINKER.SRC]ISDSORT.MAR;1

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```

      0000 50      .sbttl Declarations
      0000 51      :
      0000 52      :
      0000 53      :
      0000 54      :
      0000 55      $isddef      ;define isect descriptor
      0000 56      $isldef      ;define isect list descriptor
      0000 57
00000000 58      .psect $code$,exe,nowrt
      0000 59
00000028 00000000 00000004 00000001 0000 60 steps: .long 1, 4, 13, 40, 121, 364, 1093, 3280, 9841, 32767 ;Steps for shellsort
00000C00 00000445 0000016C 00000079 0010
      0000 61
      0000 62      numsteps = .-steps/4
      0000 63      .default displacement,word
      0028
      0028
      0028
```



```
0028 65 .sbttl lnk$sortisects sort image section descriptors
0028 66
0028 67 :++
0028 68 :
0028 69 : Inputs:
0028 70 :
0028 71 : 4(ap) number of entries in list
0028 72 : 8(ap) Address of list of isect descriptor addresses
0028 73 :
0028 74 : Outputs:
0028 75 :
0028 76 : the list is sorted
0028 77 :--
0028 78 :
07FC 0028 79 .entry lnk$sortisects,^m<r2, r3, r4, r5, r6, r7, r8, r9, r10>
002A 80
002A 81 :
002A 82 : determine highest step to use
002A 83 :
002A 84 : clrl r10 ;index starts at 0
002C 85 : movl 4(ap),r0 ;get number of keys
0030 86 10$: cmpl steps+8[r10],r0 ;this step high enough?
0035 87 : bgeq 20$ ;if geq yes
0037 88 : acbl #<numsteps-3>,#1,r10,10$ ;no--look through all - 3
003D 89 : movl #<numsteps-3>,r10 ;lots of symbols--use all steps
0040 90 20$: subl3 #4,8(ap),-(sp) ;set table address-4 on stack
0045 91 : pushl r0 ;set # of entries on stack
0047 92 : cmpl (sp),#1 ;If there are not at least two entries
004A 93 : blequ sort_exit ; then quit now
004C 94 :
004C 95 : now do the shell sort on the list. The shell sort is described in
004C 96 : Knuth Vol. 3 and is also referred to as the Diminishing Increment Sort.
004C 97 :
004C 98 shell_sort:
004C 99 10$: movl steps[r10],r9 ;get step value for this 't'
0051 100 : movab 1(r9),r8 ;set up loop for step+1 to index
0055 101 20$: movl @4(sp)[r8],r6 ;get address of key block for j'th key
005A 102 : subl3 r9,r8,r7 ;i=j-h
005E 103 30$: movl @4(sp)[r7],r4 ;get address of key block for i'th key
0063 104 40$: extzv #isd$v_vpn,#isd$v_vpn,- ;extract the vpn of the isect
0066 105 : is($t_hdrisd+isd$l_vpnpc(r4),r0
0069 106 : cmpzv #isd$v_vpn,#isd$v_vpn,- ;and compare them
006C 107 : is($t_hdrisd+isd$l_vpnpc(r6),r0 ;and compare them
006F 108 : blssu 60$
0071 109 50$: addl3 r7,r9,r0 ;compute i+h
0075 110 : movl r6,@4(sp)[r0] ;ids(i+h) = val
007A 111 : brb 70$
007C 112 60$: addl3 r7,r9,r0 ;ids(i+h) = ids(i)
0080 113 : movl r4,@4(sp)[r0]
0085 114 : subl2 r9,r7 ;i=i-h
0088 115 : bgtr 30$
008A 116 : brb 50$
008C 117 70$: acbl (sp),#1,r8,20$ ;go set ids(i+h)=val
0092 118 80$: sobgeq r10,10$ ;loop for all entries in table
0095 119 sort_exit: ;loop for all steps
0095 120 : ret
0096 121
```

ISDSORT
V04-000

Sort image section descriptors L 15
lnk\$sortisects sort image section descri 15-SEP-1984 23:55:41 VAX/VMS Macro V04-00
5-SEP-1984 01:42:10 [LINKER.SRC]ISDSORT.MAR;1
0096 122 .END

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LN
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ISDSORT
Symbol table

Sort image section descriptors

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[LINKER.SRC]ISDSORT.MAR;1Page 5
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```
ISD$$_VPNPFC      = 00000004
ISD$$$_VPN        = 00000015
ISD$V$_VPN        = 00000000
ISL$B$_NEWPR      00000016
ISL$C$_SIZE       00000018
ISL$K$_SIZE       00000018
ISL$$_BUFADR      00000008
ISL$$_BUFDSC      00000008
ISL$$_BUFEND      0000000C
ISL$$_CLUDSC      00000010
ISL$$_NXTISD      00000000
ISL$$_PREVISD     00000004
ISL$$_HDRISD      00000018
ISL$W$_FLAGS      00000014
LNK$SORTISECTS    = 00000028 RG    02
NUMSTEPS          = 0000000A
SHELL_SORT        0000004C R    02
SORT_EXIT         00000095 R    02
STEPS             00000000 R    02
```

```
+-----+
! Psect synopsis !
+-----+
```

PSECT name	Allocation	PSECT No.	Attributes
. ABS .	00000000 (0.)	00 (0.)	NOPIC USR CON ABS LCL NOSHR NOEXE NORD NOWRT NOVEC BYTE
\$AB\$\$	00000018 (24.)	01 (1.)	NOPIC USR CON ABS LCL NOSHR EXE RD WRT NOVEC BYTE
\$CODE\$	00000096 (150.)	02 (2.)	NOPIC USR CON REL LCL NOSHR EXE RD NOWRT NOVEC BYTE

```
+-----+
! Performance indicators !
+-----+
```

Phase	Page faults	CPU Time	Elapsed Time
Initialization	29	00:00:00.09	00:00:00.86
Command processing	129	00:00:00.74	00:00:04.51
Pass 1	146	00:00:01.67	00:00:06.43
Symbol table sort	0	00:00:00.06	00:00:00.06
Pass 2	45	00:00:00.49	00:00:02.23
Symbol table output	4	00:00:00.01	00:00:00.07
Psect synopsis output	1	00:00:00.01	00:00:00.05
Cross-reference output	0	00:00:00.00	00:00:00.00
Assembler run totals	356	00:00:03.07	00:00:14.21

The working set limit was 1200 pages.

6331 bytes (13 pages) of virtual memory were used to buffer the intermediate code.

There were 10 pages of symbol table space allocated to hold 84 non-local and 10 local symbols.

122 source lines were read in Pass 1, producing 15 object records in Pass 2.

9 pages of virtual memory were used to define 8 macros.

+-----+
! Macro library statistics !
+-----+

Macro library name

Macros defined

\$255\$DUA28:[SYS.OBJ]LIB.MLB;1
\$255\$DUA28:[LINKER.OBJ]LNK.MLB;1
\$255\$DUA28:[SYSLIB]STARLET.MLB;2
TOTALS (all libraries)

1
1
3
5

148 GETS were required to define 5 macros.

There were no errors, warnings or information messages.

MACRO/LIS=LIS\$:ISDSORT/OBJ=OBJ\$:ISDSORT MSRC\$:ISDSORT/UPDATE=(ENH\$:ISDSORT)+LIB\$:LNK/LIB+EXECML\$/LIB

B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
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!
"
#\$%&'()*+,-./:;
=>?@AB[CD]EFGHIJ
KLMNOPQRSTUVWXYZ
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0215 AH-BT13A-SE
VAX/VMS V4.0

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